(54) Title: POT SPINNING DEVICE

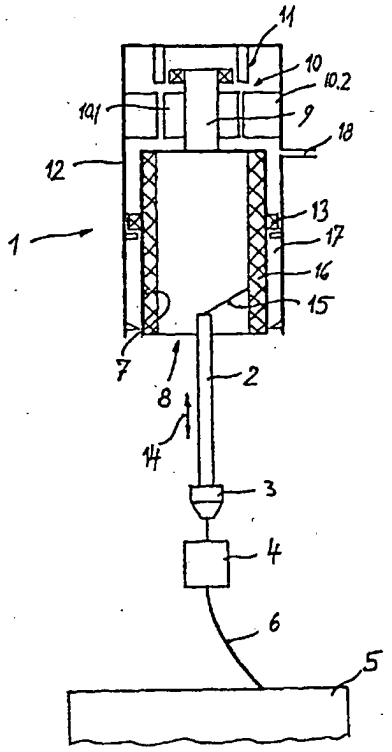
(54) Bezeichnung: TOPFSPINNVORRICHTUNG

(57) Abstract

The invention relates to a pot spinning device (1) comprising a thread guide (9) which can be moved backwards and forwards and introduced into an opening (8) on the end side of the pot (7) so as to deposit a thread on the inside wall of a spinning pot. In order to improve upon pot spinning devices of this kind, the spinning pot is connected to an electric drive mechanism (10), mounted in magnetic bearings and provided with a gastight housing. Said housing encompasses the spinning pot (7), is open in the area where there is an opening in the end side of the pot and is provided with a seal (19) to seal off the intermediate area (17) between the housing and spinning pot. The housing is also connected to a supply of light–gas via a feed line (18), thereby enabling a light–gas atmosphere to be maintained in the intermediate area.

(57) Zusammenfassung

Die vorliegende Erfindung bezieht sich auf eine Topfspinnvorrichtung (1) mit einem hin– und herbewegbaren Fadenführer (2), der zur Ablage eines Fadens auf der Innenwandung eines Spinntopfes (7) in eine endseitige Öffnung (8) des Spinntopfes einführbar ist. Um eine solche Topfspinnvorrichtung zu verbessern, ist erfindungsgemäß vorgesehen, daß der Spinntopf mit einem elektrischen Antrieb (10) verbunden und in Magnetlagern gelagert ist und mit einem zumindest den Spinntopf (7) umfassenden gasdichten Gehäuse, das im Bereich der endseitigen Öffnung des Spinntopfes offen ist und das mit einer Dichtung (19) zur Abdichtung des Zwischenraumes (17), Zwischengehäuse und Spinntopf versehen ist und das über eine Zufuhrleitung (18) mit einer Leichtgasversorgung zur Aufrechterhaltung einer Leichtgasatmosphäre im Zwischenraum verbunden ist.



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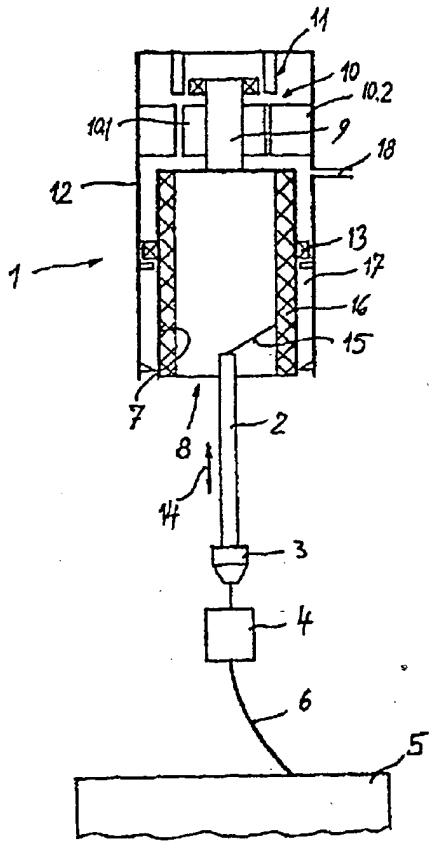
(54) DISPOSITIF A FILER A GAMELLE
(54) POT SPINNING DEVICE



(57) L'invention concerne un dispositif à filer à gamelle (1)comprenant un guide-fil (2) qui est animé d'un mouvement de va-et-vient et qui peut être introduit dans une ouverture (8) pratiquée à une extrémité du pot en vue de déposer un fil sur la paroi interne d'un pot (7). Pour améliorer un tel dispositif à filer à gamelle, le pot est relié à un entraînement électrique (10), fixé dans des paliers magnétiques et doté d'un boîtier étanche au gaz.

(57) The invention relates to a pot spinning device (1) comprising a thread guide (9) which can be moved backwards and forwards and introduced into an opening (8) on the end side of the pot (7) so as to deposit a thread on the inside wall of a spinning pot. In order to improve upon pot spinning devices of this kind, the spinning pot is connected to an electric drive mechanism (10), mounted in magnetic bearings and provided with a

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Ce boîtier abrite au moins le pot (7). Il est ouvert dans la zone de l'ouverture pratiquée à l'extrémité du pot; il est doté d'une garniture d'étanchéité permettant d'étanchéifier l'intervalle (17) entre le boîtier intermédiaire et le pot et il est relié via une conduite d'alimentation (18) à un dispositif d'alimentation en gaz léger qui permet de maintenir une atmosphère de gaz léger dans l'intervalle.

gastight housing. Said housing encompasses the spinning pot (7), is open in the area where there is an opening in the end side of the pot and is provided with a seal (19) to seal off the intermediate area (17) between the housing and spinning pot. The housing is also connected to a supply of light-gas via a feed line (18), thereby enabling a light-gas atmosphere to be maintained in the intermediate area.

Attachment (

Pot spinning device

In pot spinning methods, the thread is usually fed through a thread guide moving backwards and forwards on the rotational axis of a spinning pot and deposited on the inner wall of the spinning pot in several layers in form of a so-called spinning cake or roll lap. For improving the efficiency of such a pot spinning device it has been suggested in DE-A-4208039 to mount the spinning pot with its two ends in magnetic bearings and to provide for an electric drive, the motor of which is directly connected with the spinning pot. By using contactlessly working magnetic bearings not only the bearing friction is avoided, but it is also feasible to drive the spinning pot at a very high speed thereby considerably increasing the efficiency of the pot spinning device. In this case, however, speeds are obtained, where the air friction on the outer side of the spinning pot results in an increasing need for driving power. As a pot spinning device is provided with a plurality of such spinning pots having separate drives, the air friction results in an increase of the power to be installed, which cannot remain disregarded.

For providing a solution to the problem it was suggested in EP-A-0697041 to provide the cylindrical spinning pot, which comprises a discharging opening on one end and which can be closed by means of a lid, with a tube-shaped neck bearing on its end facing away from the discharging opening, with which also the rotor of the electric driving motor is connected. The thread guide is introduced through the neck bearing into the inner space of the spinning pot. In order to reduce the air friction acting upon the spinning pot at very high speeds, it was suggested to enclose the spinning pot with a housing, which can equally be tightly closed with a lid on the side of the discharging opening of the spinning pot, and to apply a negative pressure to the space between the spinning pot and the housing. The so feasible reduction of the driving power at an increased speed of the spinning pot and a thereby increased spinning power is influenced in view of the spinning power in that it becomes necessary each time the spinning cake is removed, to first air the space and to open both lids. Only then can the discharging device be introduced into the interior space of the spinning pot for removing the spinning cake. For starting the spinning process anew, the spinning pot and the housing have to be closed first and the required negative pressure has to be readjusted.

It is the object of the invention to improve a pot spinning device of the above-mentioned type.

According to the invention this object is provided by a pot spinning device comprising a backwards and forwards movable thread guide, which can be introduced into an opening on one end of a spinning pot for depositing a thread on the inner wall of the spinning pot, wherein the spinning pot is connected with an electric drive and mounted in magnetic bearings, and comprising a gasproof housing at least enclosing the spinning pot, which is open in the area of the opening on one end of the spinning pot, and which is provided with a seal for sealing the space between the housing and the spinning pot, and which is connected via a feeding conduct with a light gas supply for maintaining a light-gas atmosphere in the space. Such a pot spinning device has the advantage that the interior space of the spinning pot remains unsealed and that, therefore, the deposited spinning cake can be removed and the new start of the spinning process can be effected at a much shorter time. The reduction of the air friction acting on the spinning pot is obtained by filling the space with a light gas. The term „light gas" as defined by the invention designates a low-friction light gas or gas mixture having a small density, such as helium, hydrogen or the like. The light gas filling can thereby be below the ambient pressure such that at most small leakage losses can each be replaced by means of the light gas supply.

In has been provided in a particularly advantageous embodiment of the invention that the spinning pot is aligned essentially vertically and that the opening on one end thereof is directed downwardly. With this arrangement it is profited by that the light gas being in the space between the housing and the spinning pot remains „caught" in the housing due to its smaller density in comparison with the ambient air and cannot escape. This has the additional advantage that in correspondence with a further embodiment of the invention a contactlessly working seal can be provided between the housing and the spinning pot in the area of the opening on one end. This can, for instance, be effected in the form of a gap or labyrinth seal such that no energy dissipating friction forces can act on the spinning pot by means of the seal.

It is useful, if the housing also encloses the drive at least partially such that all rotating elements are disposed within the housing, with the result that only the one seal is to be provided in the area of the opening on one end of the spinning pot. It is thereby useful, if

the vertical part of the drive is disposed with its windings outside the housing. On one hand, the windings are cooled by the ambient air, and cannot significantly heat the light gas atmosphere in the housing on the other.

As the space between the housing and the spinning pot is practically subjected to an external pressure, no specific requirements in view of the stability of the housing are to be made. In view of stability and construction the housing is purposefully designed such that it carries the vertical elements of the drive and the magnetic bearings.

In a useful embodiment, the rotating part of the drive is disposed on a journal of a shaft connected with the spinning pot at a front side. In another embodiment, the journal of the shaft is connected with one magnetic bearing at least at its free end. This allows to attach the stator winding of the drive and, in case a magnetic bearing configured to form an electromagnet, the vertical winding of the magnetic bearing on the housing, wherein it becomes feasible through the arrangement of the journal of the shaft for fastening the associated rotating elements of the drive and the magnetic bearing, to provide small diameters, which is a significant aspect in view of the high speeds to be obtained, for example 80,000 revolutions per minute, already as far as the bursting strength of the rotating elements is concerned.

While it is basically possible to provide two magnetic bearings on the journal of the shaft, it is provided in an embodiment according to the invention to dispose a second magnetic bearing on the spinning pot next to a magnetic bearing disposed on the journal of the shaft. In this respect it is useful, if the magnetic bearing is disposed on the spinning pot with its plane of rotation being approximately in the area of the expected gravity center of the spinning cake deposited in the spinning pot.

Additional features of the invention are described in the subclaims.

The invention is explained in more detail by means of schematic drawings of an embodiment, wherein

Fig. 1 shows a spinning device comprising a pot spinning device,

Fig. 2 shows a vertical section through the pot spinning device.

The spinning device illustrated in fig. 1 essentially consists of a pot spinning device 1, with which a thread guide 2 comprising a thread-joining element 3 is associated. A drawing equipment 4 is connected in series with the thread-joining element 3, which is supplied with fibers to be spun in form of a prepared so-called slab 6 from a can 5.

The pot spinning device 1 essentially consists of a cylindrical spinning pot 7, the opening 8 on one end of which, forming both the charging and the discharging opening, is directed downwardly, and which is provided with a shaft journal 9 on its other closed end, to which the rotating part 10.1 of an electric driving motor 10 as well as a bearing 11 are attached. The spinning pot 7 is enclosed by a housing 12, which is closed completely and in a gasproof manner except for the area of the discharging opening 8 on one end of the spinning pot. The housing 12 carries the vertical part 10.2 of the electric drive as well as the bearing 11 connected with the shaft journal 9 and the bearing 13 disposed on the spinning pot 7.

During the spinning phase the tube-shaped thread guide 2 is moved up and down in the direction of arrow 14, such that thread 15 prepared in the thread-joining element 3 and guided through the thread guide 2 is deposited on the inner wall of the spinning pot 7 in form of a spinning cake or roll lap 16. As soon as the spinning phase is terminated, the speed of the spinning pot is reduced, and the thread guide 2 is moved away from the area of the discharging opening 8. While the spinning pot is still rotating, a winding body is introduced into the interior space of the spinning pot by means of a discharging device, which is not illustrated in more detail. During said take-over phase the speed of the spinning pot is still maintained at a level high enough to keep the spinning cake or the roll lap 16, respectively, to the inner wall of the spinning pot by means of the centrifugal force. As soon as the discharging device with the winding body inside the spinning pot has reached its final position and has been accelerated to a take-over speed, the speed of the spinning pot is correspondingly reduced such that upon falling below a minimum speed, i.e. the take-over speed and thus a reduction below a minimum flow force, the spinning cake is released from the inner wall of the spinning pot 7 and taken over by the winding body.

As the spinning pot 7 is operated at up to several 10,000 RPMs, for example 80,000 RPMs during the spinning phase, there is considerable air friction at the outside of the spinning pot 7 in space 17 between the outer wall of the spinning pot and the housing 12. In order to avoid this, the housing is provided with a feeding conduct 18, which is connected to a supply of light gas. In the area of the opening 8 of the spinning pot 7, the housing 12 is also open at the end and is sealed against the surrounding i.e. preferably contactless working seal. Through said feeding conduct 18, said space 17 is filled with a light gas, which is a low friction gas such as Helium, Hydrogen or a mix of gas of a density as low as possible and corresponding low internal frictional resistance. Said gas atmosphere in said space 17 is hereby essentially set to the surrounding pressure, such that in the area of said seal 19 only small quantities of gas will escape through convection and have to be re-supplied through said feeding conduct 18. The loss of light gas can easily be detected by an increase of driving power of said pot spinning device.

The cross-sectional view of said pot spinning device 1, shown in figure 2 in an increased scale, shows additional design features of a different embodiment.

In the embodiment, shown in figure 2, said housing 12 has a reduced diameter in the area of the drive motor 10,-whereby said stationary part 10.2 of said electric drive motor 10, which is provided with a winding on the outer side of said housing 12 in said area and, if needed, only said pole shoes reaching into the inner space of the housing 12 through respective sealed openings and can act on the rotating part 10.1, which is connected to the shaft journal 9 of said electric driving motor 10. Thereby, said winding body of said stationary part 10.2 which heats up during operation, is located outside of said housing, such that the generated lost heat is absorbed by the surrounding air and can in thereby act as cooling.

Also the bearing 11 connected with the shaft journal 9, which is advantageously configured to form an „active" magnetic bearing, is constructed in the same way. Here, too, the bobbin 11.1 of the vertical part of the magnetic bearing can be disposed on the exterior of the housing, which the pole faces of the vertical part and the rotating part connected with the shaft journal 9 are disposed in the interior of the housing.

In the illustrated embodiment example, magnetic bearing 13 connected with the spinning pot 7 is configured to form a permanent magnetic bearing, which is supported by the housing 12 by means of an axially and/or radially working encapsulated absorbing means 20.

A mechanical auxiliary bearing 21 is additionally associated with the shaft journal 9, which only starts to function when the spinning pot drops upon stopping the power supply to the upper magnetic bearing 11. This ensures that the spinning pot can phase out without being damaged once the power is interrupted during the operation.

Seal 19 at the bottom end of the housing 12 is outlined as a gap seal.

Attachment 2

Claims

1. Pot spinning device comprising a backwards and forwards movable thread guide (2), which can be introduced into an opening (8) on one end of a spinning pot (7) for depositing a thread (15) on the inner wall of the spinning pot (7), wherein the spinning pot (7) is connected with an electric drive (10) and mounted in magnetic bearings (11, 13), and comprising a gasproof housing (12) at least enclosing the spinning pot (7), which is open in the area of the opening (8) on one end of the spinning pot (7), and which is provided with a seal (19) for sealing the space (17), intermediate housing (12) and spinning pot (7), and which is connected via a feeding conduct (18) with a light gas supply for maintaining a light-gas atmosphere in the space.

2. Pot spinning device according to claim 1, characterized in that the spinning pot (7) is aligned essentially vertically and that the opening (8) on one end is directed downwardly.

3. Pot spinning device according to claim 1 or 2, characterized in that the housing (12) only encloses the rotating part (10.1) of the drive (10).

4. Pot spinning device according to one of claims 1 to 3, characterized in that a contactlessly working seal (19) is disposed between the housing (12) and the spinning pot (7) in the area of the opening (8) on one end.

5. Pot spinning device according to one of claims 1 to 4, characterized in that the housing (12) carries the vertical part (10.1) of the drive (10) and the magnetic bearings (11, 13).

6. Pot spinning device according to one of claims 1 to 5, characterized in that the drive (10) is disposed at the upper sealed end of the spinning pot (7).

7. Pot spinning device according to one of claims 1 to 6, characterized in that at least one magnetic bearing (11) is disposed in the area of the drive (10).

8. Pot spinning device according to one of claims 1 to 7, characterized in that the rotating part (10.1) of the drive (10) is disposed on a shaft journal (9) connected with the spinning pot (7) on a front side.

9. Pot spinning device according to one of claims 1 to 8, characterized in that the shaft journal (9) is connected with a magnetic bearing (11) at least at its free end.

10. Pot spinning device according to one of claims 1 to 9, characterized in that one magnetic bearing (13) is disposed on the spinning pot (7).

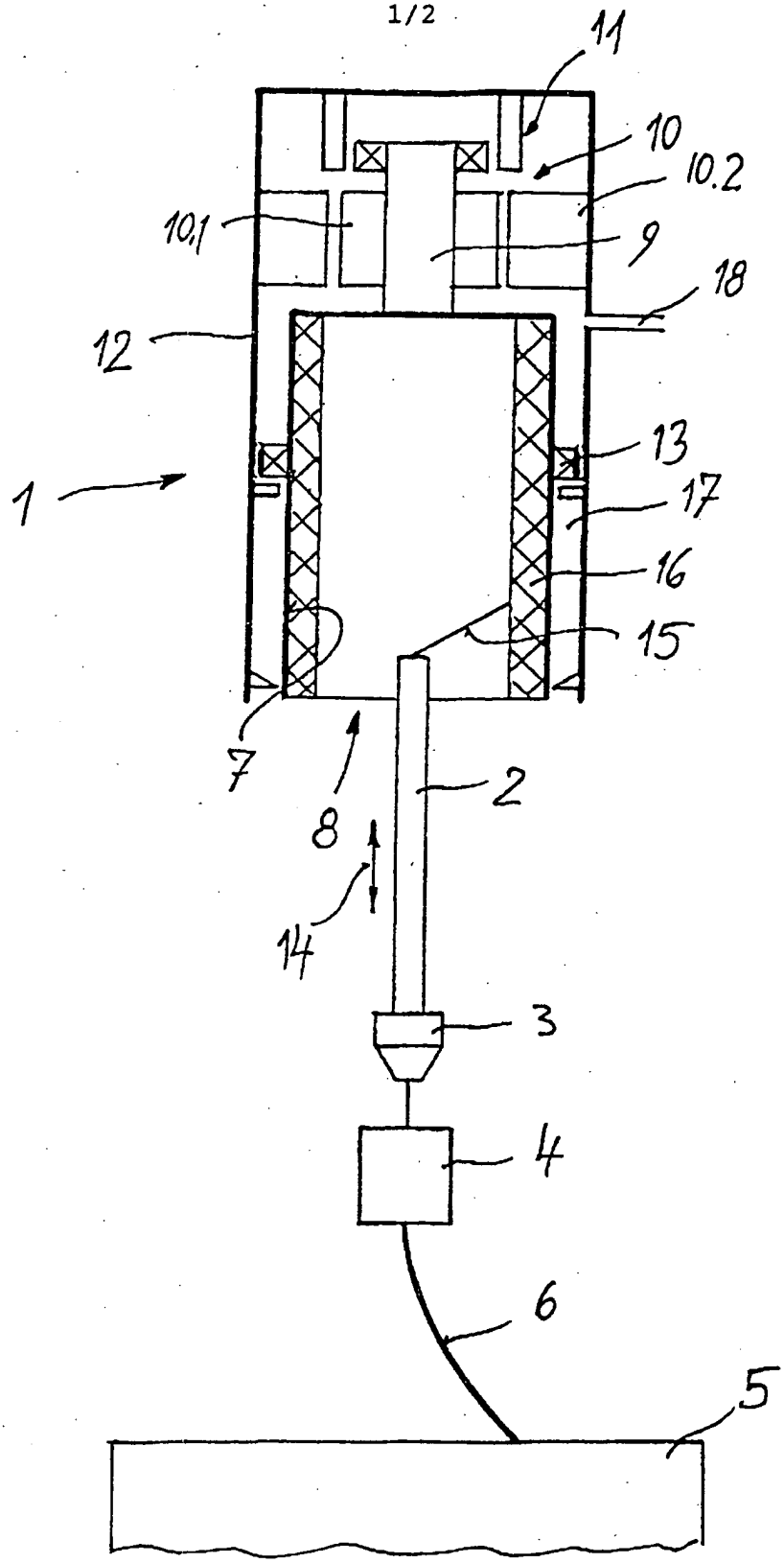
11. Pot spinning device according to one of claims 1 to 10, characterized in that the magnetic bearings (11, 13) are configured supportive in a radial and axial manner.

12. Pot spinning device according to one of claims 1 to 11, characterized in that at least the magnetic bearing (11) disposed in the area of the drive (10) is formed by an electromagnetic arrangement.

13. Pot spinning device according to one of claims 1 to 12, characterized in that the magnetic bearing (13) disposed on the spinning pot (7) is formed by a permanent magnetic arrangement.

14. Pot spinning device according to one of claims 1 to 13, characterized in that the magnetic bearing (13) disposed on the spinning pot (7) is provided with an absorbing means (20) on the side of the housing.

15. Pot spinning device according to one of claims 1 to 14, characterized in that in the area of the magnetic bearing (11) provided on the side of the drive a mechanical auxiliary bearing (21) is disposed being spaced apart during the spinning process.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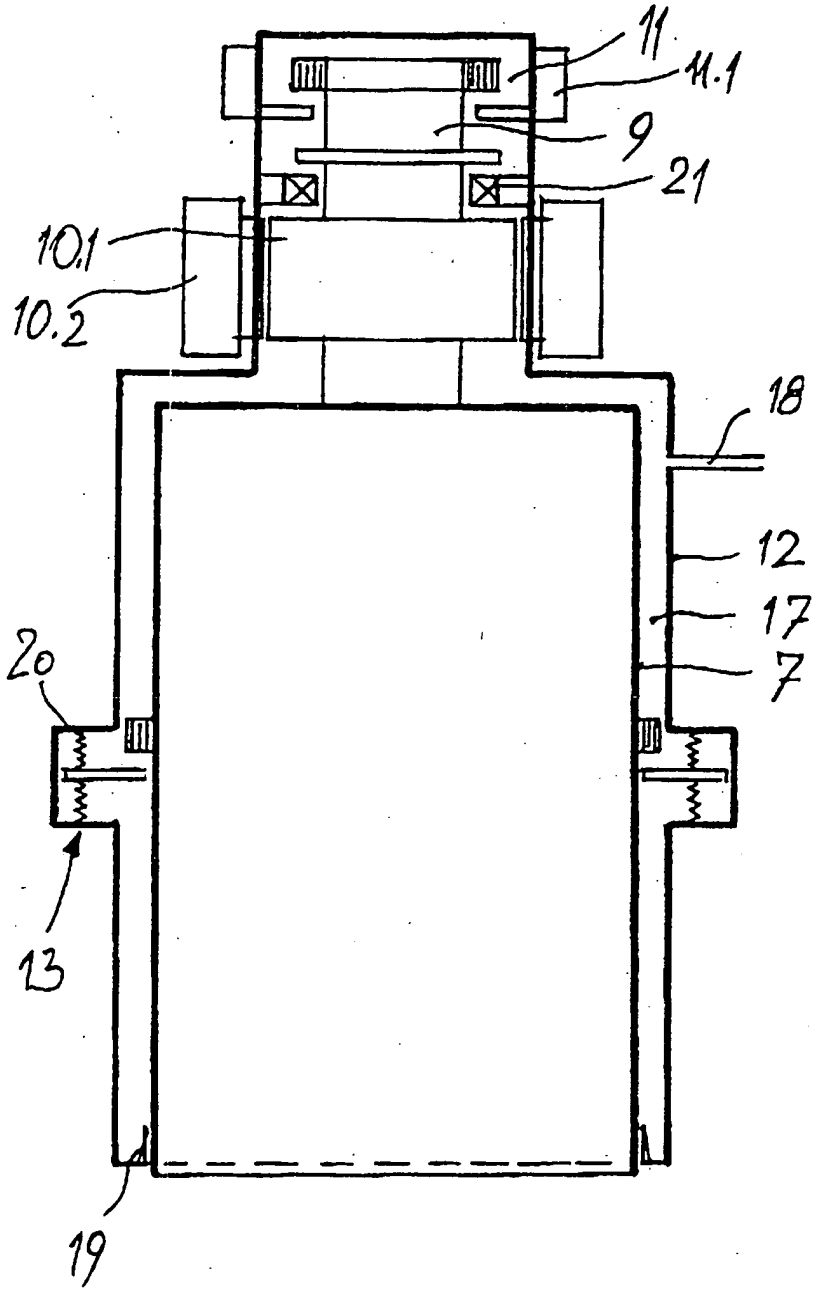
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